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TOWNSEND AND TOWNSEND AND CREW, LLP
TWO EMBARCADERO CENTER
EIGHTH FLOOR
SAN FRANCISCO, CA 94111-3834

EXAMINER

FINEMAN, LEE A

ART UNIT

PAPER NUMBER

2872

DATE MAILED: 06/27/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/942,680

Applicant(s)

SIGLER ET AL.

Examiner

Lee Fineman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-17, 27-29 and 34-66 is/are pending in the application.
- 4a) Of the above claim(s) 12-17, 27-29 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-40, 42-56 and 58-66 is/are rejected.
- 7) ☒ Claim(s) 41 and 57 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 18 April 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to an amendment filed 18 April 2003 in paper number 8 in which claims 34-66 were added and claims 1-11, 18-26 and 30-32 were cancelled. Claims 12-17, 27-29, 33 and 34-66 are pending.

Election/Restrictions

1. Claims 12-17, 27-29, 33 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention and species, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 5.

Drawings

2. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 18 April 2003 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 47 and 54 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 47 and 54 have the limitation "approximately at or within about

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50 millimeters” which is vague and indefinite. Language like “within about” is ambiguous and broad, rendering the scope of the claim unascertainable.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 49, 52-54, and 56 are rejected under 35 U.S.C. 102(b) as being anticipated by Duncan et al., U.S. Patent No. 5,905,591.

Regarding claims 49, 52-54 and 56, Duncan et al. disclose a distributed aperture optical system (figs. 4-6) comprising a plurality of collector telescopes (22), each having an intermediate image plane (at 42) at which intermediate images are formed; and a plurality of phase plates (48 or 50) corresponding to the plurality of collector telescopes, each phase plate, which has substantially no optical power (inherent in a flat mirror) is disposed approximately at or near the image plane of a corresponding collector telescope (fig. 5) and has a surface adapted to adjust phase relationships of the images (column 6, lines 40-49). Duncan et al. meets the limitations of claim 54, in as much as the claim is able to be understood in light 35 U.S.C 112 rejection made above.

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7. Claims 61 and 63-66 are rejected under 35 U.S.C. 102(e) as being anticipated by Braunecker et al., U.S. Patent No. 6,426,834 B1.

Regarding claims 61 and 63-66, Braunecker et al. disclose a method of adjusting a phase relationship in a distributed aperture optical system wherein distortion is associated with sine magnification error (column 4, lines 34-43) as shown in fig. 1 comprising receiving electromagnetic radiation (1) from one or more sources at a first mirror device (3); receiving a portion of the ~~of the~~ electromagnetic radiation reflected from the first mirror device at a second mirror device (4); transmitting a portion of the electromagnetic radiation reflected from the second mirror device through a phase plate (7) that is configured to approximately phase the electromagnetic radiation transmitted through the phase plate to reduce distortion in a resulting image (abstract, column 2, lines 14-20), which is a phase error corrector; receiving a portion of the electromagnetic radiation transmitted through the phase plate at a third mirror device (5); and wherein the phase plate is approximately non-optically powered (the phase plate is planar, fig. 1).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 34-37, 39-40, 42-43 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duncan et al. in view of Korsch, U.S. Patent No. 4,101,195.

Regarding claims 34-37, 39-40, 42 and 43, Duncan et al. disclose a distributed-aperture telescope (figs. 4-6) having a distributed aperture, the distributed-aperture telescope comprising a plurality of subaperture telescopes (22) positioned within the distributed aperture, wherein each telescope includes a primary mirror device (32), the primary mirror device being configured to receive electromagnetic radiation (38) from one or more sources; a secondary mirror device (34) coupled to the primary mirror device, the secondary mirror device being configured to redirect a portion of the electromagnetic radiation reflected from the primary mirror device (fig. 5); a tertiary mirror device (44) coupled to the secondary mirror device, the tertiary mirror device being configured to redirect a portion of the electromagnetic radiation from reflected the secondary mirror device; an intermediate image plane (at 42) disposed between the secondary mirror device and the tertiary mirror device; and a phase plate (48), which has substantially no optical power (inherent in a flat mirror), disposed within a vicinity of the intermediate image plane, wherein the phase plate is configured to adjust a phase relationship of the portion of the electromagnetic radiation associated with a resulting image (column 6, lines 40-49) and is a phase-error corrector configured to reduce a sine magnification error associated with the phase relationship and reduce distortion of the resulting image (column 3, lines 33-40); wherein the primary mirror device is disposed between the second mirror device and the tertiary mirror device (fig. 5); wherein each primary mirror device has a central aperture (40) formed therein; and a portion of the electromagnetic radiation reflected from the secondary mirror devices passes through the central apertures formed in the primary mirror devices (fig. 5); and wherein the intermediate image planes are disposed between the primary mirror devices and the tertiary mirror devices (fig. 5). Duncan et al. disclose the claimed invention except for each subaperture

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telescope being a three-mirror anastigmat (TMA). Korsch teaches an anastigmatic three-mirror telescope in fig. 2. It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the subaperture telescopes of Duncan et al. with three-mirror anastigmatic telescopes as suggested by Korsch to provide high resolution over a wide field of view with more efficient baffling to reduce stray light (column 3, lines 40-43, Korsch). Duncan et al. in view of Korsch meets the limitations of claim 47, in as much as the claim is able to be understood in light 35 U.S.C 112 rejection made above.

10. Claims 38 and 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over.

Duncan et al. in view Korsch as applied to claim 34 above, and further in view of Braunecker et al.

Duncan et al. in view of Korsch as applied to claim 34 above disclose the claimed invention except wherein each phase plate is a refractive element or a diffractive element; wherein each phase plate is a refractive element having a flat surface and a corrector surface configured to correct for sine magnification errors associated with the phase relationships of the images; wherein the corrector surface is defined by a rotationally symmetric polynomial.

Braunecker et al. teaches a telescope system (fig. 1) with a phase plate (7) is a refractive element or a diffractive element (column 8, lines 52-54); wherein each phase plate is a refractive element having a flat surface and a corrector surface configured to correct for sine magnification errors associated with the phase relationships of the images (column 4, lines 34-43 and column 9, lines 31-64); wherein the corrector surface is defined by a rotationally symmetric polynomial. It would

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have been obvious to one of ordinary skill in the art at the time the invention was made to replace the phase plates of Duncan in view of Korsch with the refractive or diffractive phase plates of Braunecker et al. to be able to simplify the apparatus (less parts) while retaining improved wavefront quality.

11. Claims 46 and 50-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duncan et al. in view of Korsch and Braunecker et al. as applied to claim 45 above, and further in view of Cook, U.S. Patent No. 5,550,672.

Duncan et al. in view of Korsch and Braunecker et al. as applied to claim 45 above disclose the claimed invention except wherein the polynomial is of the general form $z = (cy^2/1 + \sqrt{1 - (k+1)c^2y^2}) + Dy^4 + Ey^6 + Fy^8 + Gy^{10}$ where z is height, y is a radial coordinate, D , E , F , G , C and K are aspheric coefficients that are varied during a design process to effectively minimize the sine magnification errors, c is a vertex curvature, and k is a conic constant. Cook teaches a telescope (fig. 2) with a corrector mirror (26) wherein the corrector surface is defined by a rotationally symmetric polynomial of the general form $z = (cy^2/1 + \sqrt{1 - (k+1)c^2y^2}) + Dy^4 + Ey^6 + Fy^8 + Gy^{10}$ where z is height, y is a radial coordinate, D , E , F , G , C and K are aspheric coefficients that are varied during a design process to effectively minimize the sine magnification errors, c is a vertex curvature, and k is a conic constant (column 3, line 46-column 4, line 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the polynomial suggested by Cook in the system of Duncan et al. in view of Korsch and Braunecker et al. to corrections of image aberrations and distortion.

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12. Claim 48 is rejected under 35 U.S.C. 103(a) as being unpatentable over Duncan et al. in view of Korsch as applied to claim 34 above, and further in view of LAMA Project Overview, www.astro.ubc.ca/lmt/lama/documents [online] (henceforth LAMA).

Duncan et al. in view of Korsch disclose the claimed invention but are silent to the size of the distributed aperture. LAMA teaches distributed aperture telescopes with large distributed apertures including 42 meters (pages 3 and 44). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the distributed aperture of Duncan et al. in view of Korsch about 44.6 meters as suggested by LAMA to provide higher resolution for further astronomical exploration.

13. Claims 55 and 58-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Duncan et al. in view of Braunecker et al.

Duncan et al. disclose the claimed invention except wherein each phase plate is a refractive element or a diffractive element; wherein each phase plate is a refractive element having a flat surface and a corrector surface configured to correct for sine magnification errors associated with the phase relationships of the images; wherein the corrector surface is defined by a rotationally symmetric polynomial. Braunecker et al. teaches a telescope system (fig. 1) with a phase plate (7) is a refractive element or a diffractive element (column 8, lines 52-54); wherein each phase plate is a refractive element having a flat surface and a corrector surface configured to correct for sine magnification errors associated with the phase relationships of the images (column 4, lines 34-43 and column 9, lines 31-64); wherein the corrector surface is defined by a rotationally symmetric polynomial. It would have been obvious to one of ordinary skill in the art

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at the time the invention was made to replace the phase plates of Duncan with the refractive or diffractive phase plates of Braunecker et al. to be able to simplify the apparatus (less parts) while retaining improved wavefront quality.

14. Claim 60 is rejected under 35 U.S.C. 103(a) as being unpatentable over Duncan et al. in view of Braunecker et al. as applied to claim 59 above, and further in view of Cook.

Duncan et al. in view of Braunecker et al. as applied to claim 59 above disclose the claimed invention except wherein the polynomial is of the general form $z = (cy^2/1 + \sqrt{1 - (k+1)c^2y^2}) + Dy^4 + Ey^6 + Fy^8 + Gy^{10}$ where z is height, y is a radial coordinate, D , E , F , G , C and K are aspheric coefficients that are varied during a design process to effectively minimize the sine magnification errors, c is a vertex curvature, and k is a conic constant. Cook teaches a telescope (fig. 2) with a corrector mirror (26) wherein the corrector surface is defined by a rotationally symmetric polynomial of the general form $z = (cy^2/1 + \sqrt{1 - (k+1)c^2y^2}) + Dy^4 + Ey^6 + Fy^8 + Gy^{10}$ where z is height, y is a radial coordinate, D , E , F , G , C and K are aspheric coefficients that are varied during a design process to effectively minimize the sine magnification errors, c is a vertex curvature, and k is a conic constant (column 3, line 46-column 4, line 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the polynomial suggested by Cook in the system of Duncan et al. in view of Braunecker et al. to corrections of image aberrations and distortion.

15. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Braunecker et al. in view of Korsch.

Braunecker et al. disclose the claimed invention except for receiving a portion of the electromagnetic radiation reflected from the tertiary mirror at a fold flat mirror having an aperture formed therein. Korsch teaches in fig. 2 a method of receiving a portion of the electromagnetic radiation reflected from the first mirror device (10) at a second mirror device (16) to a tertiary mirror (20) and receiving a portion of the electromagnetic radiation reflected from the tertiary mirror at a fold flat mirror (40) having an aperture (42) formed therein. It would have been obvious to one of ordinary skill in the art at the time the invention was made to insert a fold flat mirror having an aperture formed therein in the system of Braunecker to provide more efficient baffling to reduce stray light (column 3, lines 40-43, Korsch).

Allowable Subject Matter

16. Claims 41 and 57 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter:

Claims 41 and 57 have allowable subject matter over the prior art for at least the reason that the prior art fails to teach and/or suggest “wherein the phase plate are disposed within the central aperture formed in the flat fold mirror” as set forth in the claimed combination.

The combination of Duncan et al. and Korsch disclose a distributed-aperture telescope (figs. 4-6, Duncan) having a distributed aperture, the distributed-aperture telescope comprising a plurality of TWAs positioned within the distributed aperture, wherein each TWA includes a

primary mirror device (32, Duncan); a secondary mirror device (34, Duncan); a tertiary mirror device (44, Duncan); a phase plate (48, Duncan), and a fold flat mirror (40, Korsch) having an aperture (42, Korsch) formed therein but not wherein the phase plates are disposed within the central aperture formed in the flat fold mirror as claimed.

Response to Arguments

18. Applicant's arguments with respect to claim 34-66 have been considered but are moot in view of the new ground(s) of rejection.

19. It is noted by the Examiner that the claim and drawing objections made in the previous Office Action have been withdrawn due to amendment by the Applicant.

Conclusion

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lee Fineman whose telephone number is (703) 305-5414. The examiner can normally be reached on Monday - Friday 7:30 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on (703) 305-0024. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.



LAF
June 22, 2003


MARK A. ROBINSON
PRIMARY EXAMINER